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UNITED STATES PATENT APPLICATION

of

MARK B. ORTON

for

WINDOW AND DOOR FRAME BRACING DEVICE

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CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of and claims priority to United States Provisional Patent Application Number 60/444,859 titled "WINDOW AND DOOR BUCK BRACING SYSTEM" and filed on February 4, 2003 for Mark B. Orton.

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0002] The invention relates to a portable and collapsible bracing and support system for door, window and other openings in forms and forming materials commonly used in the construction industry.

DESCRIPTION OF THE RELATED ART

[0003] Concrete walls are commonly formed onsite using a number of forming materials. Recently, insulated concrete forms (ICF) have become a popular method to form concrete walls. ICFs are hollow "blocks" or "panels" made of plastic foam that construction crews stack into the shape of the walls of a building. The workers then fill the center with reinforced concrete to create the structure. There are many styles of ICFs, each with some variations in design and materials.

[0004] There are three main types of ICF forms: blocks, planks and panels. The most common are hollow blocks. The blocks are generally held together with plastic or steel connectors that extend to the faces of the block, also providing a fastening point for wall finishes. These blocks are typically 16 in. high by 48 in. long. The overall width depends on the concrete thickness, which can vary from 4 in. for an above-grade wall to 12 in. or more for basement walls. Plank forms differ from blocks in that the foam sides are longer and narrower, typically 1 ft. by 8 ft. Panel forms have sides as large as 4 ft. by 8 ft.

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[0005] ICFs sold in North America are generally made of either expanded polystyrene (EPS), extruded polystyrene (XPS), polyurethane, or a cement-foam composite. ICFs are stacked one on top of another, like building blocks, to form a wall. Concrete pumping trucks may then be used to pump concrete into the ICF forms. Once the reinforced concrete has cured, the ICF is left in place to provide both an insulating layer and vapor barrier to the concrete wall. Structures built with ICF walls have a much more even temperature throughout the day and night, they have less flex and vibration due to the rigidity of the concrete, and they allow about one-sixth as much sound to pass through the ICF wall compared with an ordinary frame wall. Additionally, the superior insulation, air tightness, and mass of the walls cut the amount of energy needed for heating and cooling by 30-40%.

[0006] However, forming doors and windows in ICF walls has presented construction crews with time-delaying problems. The creation of openings in the ICF walls requires a time consuming process of building temporary support walls to fill the opening. This is accomplished by cutting out a properly sized opening in the ICF and then building a framed support wall of the same size out of lumber. This temporary support wall is then placed in the ICF void opening and secured for use during the concrete pouring stage. Once the concrete material has sufficiently hardened, this temporary wall is dismantled and removed from the ICF opening. The material used to create this temporary wall is often discarded as waste due to the damage caused during the dismantling process.

[0007] Properly securing the temporary framed support is very difficult because the temporary support can be dislodged during the pouring phase as the concrete material is fed into the forms or as it is tamped or vibrated into place. As a result of moving or shifting the temporary framed support, the permanent opening in the concrete wall can become out of plumb, level, or square. Since it is nearly impossible to properly fit a door or window into an opening that is not square, additional work is required to alter the concrete wall opening. The required work to obtain a square opening in a cured concrete wall can cost many thousands of dollars and cause an un-anticipated delay in the construction process.

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[0008] Due to the increasing use of ICF in the construction of concrete walls and the difficulty in properly maintaining a square opening during a concrete pour, a need exists for a bracing device that is portable, able to be quickly adjusted to any opening dimension, and strong enough to maintain a square opening during concrete pouring.

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SUMMARY OF THE INVENTION

[0009] The present invention has been developed in response to the present state of the art, and in particular, in response to the problems and needs in the art that have not yet been fully solved by currently available bracing systems. Accordingly, the present invention has been developed to provide a device and method for window and door frame bracing that overcomes many or all of the above-discussed shortcomings in the art.

[0010] The device for bracing is provided with a plurality of bracing members, each bracing member having an adjustable length, a coupling device configured to couple the bracing members together, and wherein the coupling device allows the bracing members to support an enclosed geometric shape. Furthermore, each bracing member comprises a first and a second end. In one embodiment, the device may also include a plurality of articulating feet, each bracing member having a first articulating foot connected to the first end, and a second articulating foot connected to the second end.

[0011] In a further embodiment, each bracing member comprises an elongated hollow member having a first telescoping member configured to extend outward from the first end of each bracing member and a second telescoping member configured to extend outward from the second end of each bracing member. Additionally, the first and second telescoping members each further may comprise a plurality of locking pins configured to maintain an extended position of the first and second telescoping member with respect to the corresponding bracing member.

[0012] The device may also include a plurality of holes configured to receive the coupling device. In one embodiment, the first telescoping member is configured to extend and maintain a desired distance from the first end and the second telescoping member is configured to extend and maintain substantially the same distance from the second end as the desired distance. In a further embodiment, each bracing member may comprise a hole located at the longitudinal center of the bracing member, the hole configured to receive the coupling device. Additionally, the coupling device is configured to couple the bracing

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members such that the bracing members are rotatable through a 360-degree range around the coupling device. The coupling device may also be configured to couple a first bracing member and a second bracing member to maintain a substantially perpendicular relationship between the first bracing member and the second bracing member.

[0013] The present invention may also include a method for bracing and supporting an enclosed geometric shape. In one embodiment, the method comprises providing a bracing device having a plurality of bracing members, each bracing member having an adjustable length, a coupling device that couples the bracing members together and allows the bracing members to support substantially all sides of an enclosed geometric shape. Additionally, the method may comprise adjusting the length of one of the bracing members to substantially the same length as a diameter of two opposing sides of the enclosed geometric shape. In a further embodiment, the method comprises installing the first bracing member between the two opposing sides, and repeating the length adjustment and installation of additional bracing members of the bracing device until substantially all the sides of the enclosed geometric shape are supported by at least one bracing member of the bracing device.

[0014] The method may also include articulating a plurality of feet, each bracing member having a first articulating foot attached to a first end, and a second articulating foot attached to a second end. In one embodiment, the method comprises maintaining an extended position of the first and second telescoping member, and rotating the bracing members about the coupling device through a 360-degree range. In a further embodiment, the method may comprise maintaining a substantially perpendicular relationship between a first and a second bracing member

[0015] Reference throughout this specification to features, advantages, or similar language does not imply that all of the features and advantages that may be realized with the present invention should be or are in any single embodiment of the invention. Rather, language referring to the features and advantages is understood to mean that a specific feature, advantage, or characteristic described in connection with an embodiment is included

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in at least one embodiment of the present invention. Thus, discussion of the features and advantages, and similar language, throughout this specification may, but do not necessarily, refer to the same embodiment.

[0016] Furthermore, the described features, advantages, and characteristics of the invention may be combined in any suitable manner in one or more embodiments. One skilled in the relevant art will recognize that the invention can be practiced without one or more of the specific features or advantages of a particular embodiment. In other instances, additional features and advantages may be recognized in certain embodiments that may not be present in all embodiments of the invention.

[0017] These features and advantages of the present invention will become more fully apparent from the following description and appended claims, or may be learned by the practice of the invention as set forth hereinafter.

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BRIEF DESCRIPTION OF THE DRAWINGS

[0018] In order that the advantages of the invention will be readily understood, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments that are illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings, in which:

[0019] Figure 1 is a schematic block diagram illustrating one embodiment of a bracing member in accordance with the present invention;

[0020] Figure 2 is a schematic block diagram illustrating one embodiment of a plurality of bracing members in accordance with the present invention;

[0021] Figure 3 is a schematic block diagram illustrating one embodiment of a telescoping member in accordance with the present invention;

[0022] Figure 4a is a side view schematic block diagram illustrating one embodiment of an articulating foot in accordance with the present invention;

[0023] Figure 4b is a top view schematic block diagram illustrating one embodiment of an articulating foot in accordance with the present invention;

[0024] Figure 5 is a schematic block diagram illustrating one embodiment of a bracing system supporting an enclosed geometric shape in accordance with the present invention;

[0025] Figure 6 is a schematic block diagram illustrating an alternative embodiment of a bracing system supporting an enclosed geometric shape in accordance with the present invention;

[0026] Figure 7 is a side perspective view illustrating one embodiment of a brace clip in accordance with the present invention;

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[0027] Figure 8 is a schematic flow chart diagram illustrating one embodiment of a method for bracing in accordance with the present invention; and

[0028] Figure 9 is a schematic flow chart diagram illustrating an alternative embodiment of a method for bracing in accordance with the present invention.

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DETAILED DESCRIPTION OF THE INVENTION

[0029] Reference throughout this specification to "one embodiment," "an embodiment," or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment," "in an embodiment," and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment.

[0030] Furthermore, the described features, structures, or characteristics of the invention may be combined in any suitable manner in one or more embodiments. In the following description, numerous specific details are provided. One skilled in the relevant art will recognize, however, that the invention can be practiced without one or more of the specific details, or with other methods, components, materials, and so forth. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of the invention.

[0031] Figure 1 is a schematic block diagram illustrating one embodiment of a bracing member 100 in accordance with the present invention. In one embodiment, the bracing member 100 comprises an elongated member configured with an adjustable length. In a further embodiment, the bracing member 100 may be constructed from a length of metal tubing or pipe. Alternatively, the bracing member 100 may be formed from a length of bar stock. The bracing member may be constructed from any suitable material such as, but not limited to, aluminum, iron, steel, stainless steel, or brass.

[0032] The bracing member 100 may comprise a plurality of holes (not shown) configured to receive a plurality of locking pins 102. The bracing member 100 may be used with a single locking pins 102, or alternatively with a plurality of locking pins 102. Additionally, the bracing member 100 may include a hole 104 configured to receive a coupling device (not shown). The hole 104 may be longitudinally centered on the bracing

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member 100. In a further embodiment, the bracing member 100 further comprises feet 106. Further discussion regarding the feet 106 will be given below with reference to Figure 4.

[0033] Figure 2 is a schematic block diagram illustrating one embodiment of a plurality 200 of bracing members 100. The bracing members 100 may be coupled together by a coupling device 202. In one embodiment, the coupling device 202 comprises a removable carriage bolt. The each bracing member 100 is configured to rotate about the coupling device 202 through a 360-degree range.

[0034] Figure 3 is a schematic block diagram illustrating one embodiment of a telescoping member 300 in accordance with the present invention. The telescoping member 300 may be configured to extend outward from one end of the bracing member 100. As depicted, the telescoping member 300 may comprise a two stage extension mechanism. In one embodiment, the telescoping member 300 comprises a first, larger extension member 302, and a second, smaller extension member 304. The first and second extension members 302, 304 may be constructed from a length of metal tubing or pipe. In a further embodiment, the first and second extension members 302, 304 may be constructed from a material similar to the bracing member 100.

[0035] The locking pin 102 may be configured to maintain an extended position of the first and second extension members 302, 304. In one embodiment, the bracing member 100, the first extension member 302, and the second extension member 304 are configured with a plurality of holes (not shown) into which a locking pin 102 may be inserted. The telescoping extension members 302, 304 may then be locked into a variety of configurations. In one embodiment, the extension members 302, 304 are configured to extend to a length of approximately 10 feet. Alternatively, the bracing member 100 may be configured with as many telescoping extension members deemed necessary to brace a desired opening. In a further embodiment, the extension member 304 comprises a foot anchor 306. The foot anchor 306 may be configured to receive and secure an articulating foot 400 (described below with reference to Figure 4).

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[0036] Figure 4a is a schematic block diagram illustrating one embodiment of the articulating foot 400 of the present invention. In one embodiment the articulating foot comprises a member attachment 402 device. In a further embodiment, the member attachment device 402 comprises a carriage bolt. The carriage bolt may include a locking device, such as a wing nut 403 configured to maintain the position of the carriage bolt with respect to the foot anchor 306. The articulating foot 400 may also comprise a foot platform 404 for engaging a beam surface. The foot platform 404 may be constructed from a portion of angle iron.

[0037] Referring now to Figure 4b, shown therein is a top view perspective diagram illustrating a plurality of retaining devices 406. The retaining devices 406 are configured to maintain the head of the member attachment device 402 while allowing the foot platform 404 to pivot and engage a beam surface from a plurality of different angles. Alternatively, the foot platform 404 and the member attachment device 402 may have a ball and socket configuration and attain the same result of allowing the foot platform 404 to engage surfaces from a plurality of angles.

[0038] Figure 5 is a schematic block diagram illustrating one embodiment of a bracing system 500 in accordance with the present invention. In one embodiment, the bracing system 500 comprises a plurality of bracing members 100 coupled by the coupling device 202. As depicted, the bracing system 500 may be configured to support a window frame 502. Alternatively, the bracing system 500 may be configured to support door frames and other enclosed geometric shapes such as, but not limited to, circles, ellipses, and polygons. Articulating feet 106 may engage the surface of the window frame 502 at 90-degree angles or alternatively, at 45-degree angles.

[0039] In one embodiment, the bracing system 500 may comprise a star configuration, comprising 4 bracing member 100. A first bracing member 100 is placed vertically and secured. Once the first bracing member 100 is secured, a second bracing member 100 may be rotated about the coupling device 202 and placed horizontally. With the

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first and second bracing members 100 secured, the third and fourth bracing members 100 may be rotated and placed diagonally, completing the star configuration.

[0040] Figure 6 is a schematic block diagram illustrating an alternative embodiment of a bracing system 600. The bracing system 600 may support the window frame 502 using a horizontal and vertical configuration. The bracing members 100 are coupled together using a coupling device 602 that is configured to maintain a perpendicular relationship between bracing members 100. In one embodiment the coupling device 602 comprises a brace clip 602. The brace clip 602 is configured to attach to the bracing members in a plurality of locations.

[0041] Figure 7 is a side perspective view diagram illustrating one embodiment of a brace clip 602 in accordance with the present invention. In one embodiment, the brace clip 602 comprises a surface 702 for receiving and supporting a bracing member 100. The brace clip 602 comprises a cut out portion 704 configured to receive the locking pin 102. In order to position the brace clip 602, the locking pin 102 is first placed in a hole in the bracing member 100. The brace clip 602 is then positioned on the bracing member 100 slightly above the locking pin 102 and slid downward until the locking pin 102 is securely seated in the cut out portion 704. A second bracing member 100 may then be placed horizontally and supported by the surface 702.

[0042] Figure 8 is a schematic flow chart diagram illustrating one embodiment of a method 800 for bracing an enclosed geometric shape in accordance with the present invention. The method 800 starts 802 and a plurality of bracing members 200 is coupled 804. In one embodiment, the coupling device 202 couples 804 the plurality of bracing members 200 and allows the each bracing member 100 to rotate about he coupling device 202 through a 360-degree range. In order to brace a window, door, or other geometric frame, a user first finds and marks 806 the center of the header and sill plates. A first bracing member is set 808 on the marks and the length of the bracing member is adjusted accordingly.

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[0043] In one embodiment, adjusting the length 808 of the bracing member comprises extending the telescoping members 302, 304 and locking the telescoping members 302, 304 in place with the locking pin 102. Fine adjustment of the bracing member 100 may be accomplished by adjusting 810 the articulating foot 400. In a further embodiment, fine adjustment of the articulating foot 400 comprises inserting the carriage bolt 402 deeper into the foot anchor 306, or alternatively, retracting the carriage bolt from the foot anchor 306. Once the first bracing member 100 is secured, the second bracing member 100 may be rotated 812 into a horizontal position and adjusted in a manner as described above. Finally, the third and fourth bracing members 100 may be rotated 814 into diagonal positions and adjusted to secure the corners of the frame 502. The method 800 then ends 820.

[0044] Figure 9 is a schematic flow chart diagram illustrating an alternative embodiment of a method 900 for bracing an enclosed geometric shape in accordance with the present invention. The method 900 starts 902 and the user finds and marks 904 1/3 and 2/3 of the width of the header and sill plates of the frame 502. First and second bracing members 100 are then placed 906 on the marks and adjusted to support the opening. In one embodiment, adjusting the length 906 of the bracing members 100 comprises extending the telescoping members 302, 304 and locking the telescoping members 302, 304 in place with the locking pin 102. Fine adjustment of the bracing member 100 may be accomplished by adjusting 810 the articulating foot 400. In a further embodiment, fine adjustment of the articulating foot 400 comprises inserting the carriage bolt 402 deeper into the foot anchor 306, or alternatively, retracting the carriage bolt from the foot anchor 306.

[0045] The user may then place 908 brace clips 602 on the first and second bracing members 100. In one embodiment, placing 908 brace clips 602 comprises first placing locking pins 102 in approximately the 1/3 and 2/3 of the length of the bracing member 100. Brace clips 602 may then be positioned on the bracing member 100 slightly above the locking pin 102 and slid downward until the cut out portion 704 of the brace clip 602 is secured around the locking pin 102. Third and fourth bracing members 100 may then be

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horizontally positioned 910 in the brace clips 602 and adjusted to the width of the frame 502.The method 900 then ends 912.

[0046] The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

[0047] What is claimed is:

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